



Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force



Success Story

ENVIRONMENTALLY FRIENDLY ANTI-ICING/ DEICING FLUID HAS POTENTIAL FOR MILITARY AND COMMERCIAL APPLICATIONS



A revolutionary, environmentally friendly anti-icing/deicing fluid (ADF) developed for military aircraft is now available commercially. The new ADF, developed under an Air Force Small Business Innovation Research (SBIR) effort managed by the Materials and Manufacturing Directorate, is fully compliant with environmental regulations and is made from renewable resources.

Developed by METSS Corporation of Columbus, Ohio, and known commercially as METSS ADF-2, the new fluid performs as well as products currently in use. ADF-2 is so effective in removing and preventing ice buildup on fixed-wing aircraft surfaces, it is now being tested on rotor-winged aircraft (i.e., helicopters). METSS ADF-2 has tremendous potential for both military and commercial applications.



Air Force Research Laboratory
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Materials and Manufacturing
Technology Transfer

Accomplishment

Directorate engineers with the Systems Support Division managed the SBIR program that led to the successful development of a commercially viable, environmentally friendly replacement for glycol-based fluids, reducing or eliminating the need to capture or treat an ADF prior to releasing it into the environment. ADF-2 meets or exceeds performance objectives established under the SBIR program and was the first non-glycol, non-petroleum-based ADF certified by independent laboratories and recognized by the Federal Aviation Administration.

METSS ADF-2 technology is also certified for use as an aircraft lavatory antifreeze, potentially replacing thousands of gallons of propylene glycol-based fluids used in military and commercial aircraft. The new ADF earned an international Research and Development (R&D) 100 Award for 2001 from *R&D Magazine*, which convenes a panel of experts from industry and academia to review and rank nominations for selecting and recognizing the year's 100 most innovative and promising new technologies. This marks the third time in recent years the directorate has contributed to R&D, resulting in R&D 100 Award honors.

Background

Military and civilian airports use large quantities of glycol-based ADF. Unfortunately, one (ethylene glycol) is toxic, and the other (propylene glycol) biodegrades too rapidly. Additionally, both require special handling to avoid environmental problems.

ADF-2 effectively addresses all the major toxicity issues, including fluid disposal, water contamination, and the high biological oxygen demand (BOD) associated with propylene glycol and the toxicity of ethylene glycol. BOD is important because commercial airports and military bases are increasingly concerned about the quality of storm water runoff and the effect of deicing chemicals on receiving waters. Discharge permits are required to monitor the runoffs to determine the BOD and the presence of contaminants. The directorate's research and development effort reduced short-term BOD on receiving streams by about half when compared to propylene glycol, allowing twice as many aircraft to be deiced.

Unlike ethylene glycol, ADF-2 is nontoxic and nonhazardous to plant and animal life. It is 100% organic, biodegrades readily and completely with carbon dioxide and water, and contains no phosphates or urea, which can be harmful to natural waterways and fish. ADF-2 "waste" can be reused as a runway deicer. In addition, METSS ADF-2 can be sprayed while aircraft engines are on. By comparison, many propylene glycol deicers cannot pass this test, since they use phosphate-based corrosion inhibitors.

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (04-ML-03)